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February 6, 2003

Mr. William Norton
Executive Officer/APCO
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Re: Chevron's Comments on Staff's Technical Assessment Document: Further Study Measure 8 Flares

Dear Mr. Norton:

As part of the San Francisco Bay Area 2001 Ozone Attainment Plan for the 1-Hour National Ozone Standard, the Bay Area Air Quality Management District committed to a study measure to determine if additional emission reductions could be achieved from refinery flares. At its meeting on January 15, 2003, the Board discussed and received comment on the draft Technical Assessment Document (TAD) for Further Study Measure 8 Flares. Chevron's Environmental Specialist, Mr. Alex Stiem, testified to the Board regarding the Chevron Richmond Refinery's flaring emissions. The purpose of our presentation to the Board was to address the District staff's estimates of average daily flaring emissions contained in the draft Technical Assessment Document with comments, supported by a combination of technical and empirical data that would facilitate more accurate estimates of these flare emissions. As requested by the Board at the January 15, 2003 meeting, this letter clarifies and elaborates upon Mr. Stiem's testimony.

The initial findings of the draft Flare TAD indicate that refinery flares add 13 to 22 tons per day of VOC's (volatile organic compounds) to the regional emission inventory. We believe that District staff made several broad-reaching assumptions regarding typical refinery flare gas hydrocarbon compositions that are unfounded and inaccurate. As such, these District assumptions and emission calculation methodologies will lead to an artificially inflated flaring emission inventory for ozone forming VOC's. Based on a considerable amount of data collected over the past year and a half, and applying the appropriate technical assumptions to this data, our calculations are that the Chevron Richmond Refinery flares emit on average, less than approximately 0.5 tons per day of ozone precursor VOC's.

Chevron, along with the other Bay Area Refiners, believes that the District's hydrocarbon content calculation methodology in the Flare TAD is flawed. Methane should not be included in the hydrocarbon emission factor, since it is well known that methane is not an ozone precursor, and the purpose of the San Francisco Bay Area 2001 Ozone Attainment Plan for the 1-Hour National Ozone Standard is to reduce ozone precursors. Indeed, the District's own regulatory definitions of "organic compound" and VOC expressly **exclude** methane. *See* District Rules 1-233, 1-236, 2-1-206, and 2-1-208. Finally, independent laboratory data compiled by the Alberta Flare Research Project on flaring emissions speciation indicates that the methane hydrocarbon distribution entering a flare is about the

same as the distribution that comes out, therefore the portion of methane that isn't combusted to CO2 comes out primarily as methane, and very little is converted to other non-methane hydrocarbon constituents.

Upon examination of our flaring data, we find that when methane is removed, the average Richmond Refinery flare gas composition contains less than 35% hydrocarbon volume fraction. Therefore, Chevron disagrees with the District's use of a 75% hydrocarbon volume fraction for flare gas composition to estimate total VOC emissions from refinery flares. Although the hydrocarbon fraction of flare gas can vary from each of Richmond's flare stacks, if the District selects only a single number to characterize the hydrocarbon content in flared gas, then 35% (or less), is far more realistic than the current District proposal. The use of a 35% hydrocarbon emission factor is based on the typical gas composition of the Richmond Refinery Flare Gas Recovery System which captures flare gas from 5 of the refinery's 6 flares.

Chevron has provided flaring data to the District for events occurring between May 1, 2001 and May 31, 2002, as well as additional data through the end of 2002. An analysis of the data shows that very low non-methane hydrocarbon flare emissions are emitted when averaged over this period of time. In fact, the resulting daily average flaring emissions amounted to less than approximately 0.5 tons per day of un-combusted, non-methane hydrocarbons from the Richmond Refinery. This is not to say that Chevron's flare emissions are always less than 0.5 tons per day. It merely provides a comparative estimate of average emissions for use in the District's Flare TAD. Chevron experiences days of no flaring, as well as days of greater flaring due to emergencies, equipment failures, and equipment depressurization for preventative maintenance.

Since Board members and District staff have raised questions regarding Chevron's low daily average flare emissions, we would like to explain the reasons for this, as well as the basics of Chevron's flare use philosophy. The Richmond Refinery has full flare gas recovery capabilities. This is a very important point, because it means that although the Richmond refinery produces gas that could be routinely flared, Chevron, under normal, steady-state conditions is able to reuse this gas in its process plants.

The Richmond Refinery management of flare use provides the operational flexibility required for safe and efficient refinery operations and limits flaring to unplanned events and a limited number of planned events. Descriptions of these events are provided as follows:

1. **"Unplanned Flaring"** means a flare event that is not planned or scheduled to occur. An emergency event is an example of an unplanned event. Emergency events arise from sudden and unforeseeable events beyond the control of Chevron. An emergency situation requires immediate correction to restore normal, safe operation. It may cause unavoidable increases in emissions attributable to the emergency situation. Unplanned flaring could result from flare gas recovery compressor malfunctions, electrical

equipment failures, sudden power failure, major equipment failures, sudden process plant upsets and breakdowns, and other unforeseen events.

2. **"Planned Intermittent Flaring"** means a flaring operation of limited duration in time and volume of gas that constitutes a designed and planned process which is foreseen ahead of its actual occurrence, or is scheduled to occur. Planned flaring are typically related to the following activities:

- Flaring during the cool down and clean up procedures for some of our plant turnarounds;
- Flaring due to the depressurization of some of our process equipment for purposes including (a) preventative maintenance designed to prevent equipment failure or decline of equipment operation (b) cogeneration facility start-ups (c) compressor start-ups ((d) safety valve and rupture disc maintenance.

3. **"Planned Continuous Flaring"** includes only flare purge and pilot gas operations. Chevron flare management practices do not include continuous flaring of process gas which is not otherwise used or processed in the flare gas recovery system. Purge gas is Public Utilities Commission (PUC) quality gas (and/or nitrogen) used to maintain a non-explosive mixture of gases in the flare header or provide sufficient exit velocity to prevent any regressive flame travel back into the flare header (stack). Pilot gas is used to ignite the flare gas. Pilot gas used at the Richmond Refinery consists of PUC-quality gas. Purge and pilot gas used at the Richmond Refinery contains only approximately 2.4% non-methane hydrocarbons, resulting in insignificant emissions (estimated at only approximately 12 lbs per day).

Refinery flares are direct combustion safety devices in which air and all combustible gases react at the burner with the objective of complete and instantaneous oxidation of the combustible gases. They are not equipped with devices for fuel-air mix control or for temperature control. The EPA-approved, typically-recognized industry standard for combustion efficiency is between 98 and 99%. We do not necessarily endorse the District's application of a 98% flare combustion efficiency in the Flare TAD but have used it to calculate our reported flare emissions.

Richmond Refinery flares are not used on a routine or daily basis. Rather, they are only used on an intermittent basis, when it is not safe or possible to reuse the gas as fuel. The main reason for our low flare usage is that Chevron has a large flare gas recovery compressor capacity that normally exceeds the amount of process gas in the system. This excess compressor capacity however is only one of the ways that Chevron prevents process gas from being flared on a routine basis. Other ways to minimize flaring events are by controls such as:

- Engineering and equipment design features to minimize process gas;

- Installation of redundant equipment;
- Installation of flow monitors to accurately identify process flows;
- Maintenance programs that identify and repair leaking components;
- Coordinated schedules to reduce planned shutdowns;
- Study programs involving operating set points on controllers and safety devices to determine if a different setting could minimize emissions;
- Detailed Flare Plans for our plant turnarounds which indicate when venting to the flare will be needed, how long it will last and the quantity of emissions that will result. The plans are developed with the intent of minimizing flows to the flare. Plans for reduction of emissions from planned flaring activities including those which result from planned depressurizing of vessels, compressors and process units; some of which include complicated targeted maximum equipment turnaround flared gas volumes.

Chevron currently monitors its flaring volumes (in standard cubic feet per day) of all planned and unplanned flare gas volumes through a network of process flow meters. Although these monitors do not directly measure flare stack flows, Chevron's process engineering knowledge and expertise in the refinery flare gas system contributes to a high degree of confidence in reported flare flow estimates. Presently Chevron provides the District with its best engineering estimates of flare gas volume and emissions, and also reports these emissions on a monthly basis. We do however; recognize the obligations of the District to define a verifiable and quantifiable method of monitoring flares for pubic awareness and ozone attainment planning. As such, we look forward to working with the District in the development and promulgation of a flare-monitoring rule and we would like to see this rule completed as quickly as possible.

In summary, the Chevron refinery is very focused on minimizing the use of its flares. It has significant flare gas recovery capacity and has a philosophy that has eliminated planned continuous flaring. We are working hard to minimize flaring associated with unplanned events by improving the reliability of our plants and we are reviewing our procedures to minimize flaring associated with planned events. Therefore, based on a considerable amount of data collected over the past year and a half, and applying the appropriate technical assumptions, the Richmond Refinery emits on average less than approximately 0.5 tons per day of ozone precursor VOC's.

Sincerely,

J.W. Hartwig

bc: Mr. Bob Chamberlin
Mr. Dave Farabee
Mr. Alex Stiem
Mr. Walt Gill